TETRA TECH

January 23, 2017

Mr. Todd Davis
Site Assessment Manager
U.S. Environmental Protection Agency
11201 Renner Boulevard
Lenexa, Kansas 66219

Subject: **Preliminary Assessment Report**
PCE Chestnut Street, Atlantic, Cass County, Iowa
CERCLIS ID No. IAN000703467
U.S. EPA Region 7, START 4, Contract No. EP-S7-13-06, Task Order No. 0111.003
Task Monitor: Todd Davis, Site Assessment Manager

Dear Mr. Davis:

Tetra Tech, Inc. is submitting the enclosed Preliminary Assessment report regarding the above-referenced facility. A Hazard Ranking System (HRS) scoring memorandum associated with the Site will be submitted under separate cover. If you have any questions or comments regarding this submittal, please contact the Project Manager at (816) 412-1957.

Sincerely,

[redacted]
START Project Manager

[redacted]
START Program Manager

Enclosures

cc: [redacted] START Project Officer (cover letter only)

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PRELIMINARY ASSESSMENT AT THE PCE CHESTNUT STREET SITE ATLANTIC, CASS COUNTY, IOWA

CERCLIS ID No. IAN000703467

Superfund Technical Assessment and Response Team (START) 4 Contract
Contract No. EP-S7-13-06, Task Order 0111.003

Prepared For:

U.S. Environmental Protection Agency
Region 7
Superfund Division
11201 Renner Boulevard
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January 23, 2017

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1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA), Region 7, under authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), tasked Tetra Tech, Inc. (Tetra Tech) to conduct a preliminary assessment (PA) of the PCE Chestnut Street project site (the Site) in Atlantic, Iowa, under Superfund Technical Assessment and Response Team (START) 4 Contract Number EP-S7-13-06, Task Order 0111.003. The Site is in an area of Atlantic, Iowa where dry cleaning operations historically occurred.

Purposes of this PA were to (1) review existing information regarding the Site and its environs in order to assess the threat(s), if any, posed to public health, welfare, or the environment; and (2) identify data gaps and determine if further investigation under CERCLA is warranted. The scope of this PA includes a review of information available from federal, state, and local agencies, and development of a report that summarizes the findings.

By use of these sources of existing information and sampling data, the facility was to be evaluated according to the EPA Hazard Ranking System (HRS) criteria to assess the relative threat associated with actual or potential releases of hazardous substances at the facility. The HRS has been adopted by EPA to help set priorities for further evaluation and eventual remedial action at hazardous waste sites. The HRS is the primary method of determining a site's eligibility for placement on the National Priorities List (NPL). The NPL identifies facilities at which the EPA may conduct remedial response actions. This report summarizes the findings of these preliminary investigative activities.

PCE Chestnut Street was identified as a potential hazardous waste site and entered into the Superfund Enterprise Management System (SEMS) with an EPA ID number of IAN000703467 (Tetra Tech 2016).

Apparent Problem

The Site was identified during an investigation at the adjacent PCE Former Dry Cleaners site during March 2015, when analytical data from indoor air and sub-slab vapor samples collected within the downtown business district of Atlantic indicated elevated concentrations of tetrachloroethene (PCE) unrelated to the PCE Former Dry Cleaners site. Removal activities during July and October 2015 included collection of vapor intrusion and groundwater samples. Vapor intrusion sampling was conducted to define the extent of indoor inhalation threats presented by PCE contamination in the surrounding area.

Groundwater sampling was conducted to identify source areas of the PCE contamination, and to define the extent of PCE contamination in groundwater (Tetra Tech 2016).

2.0 SITE INFORMATION

The Site's location, description, and operational history; waste characteristics; and previous investigations of the Site are discussed below.

2.1 SITE LOCATION/DESCRIPTION

The Site is in the downtown business district of the rural community of Atlantic, Iowa. The Site is within the NE ¼ of the SE ¼ of Section 5, Township 76N, and Range 36W in Cass County, Iowa (see Appendix A, Figure 1). Physical addresses of potential source areas within the Site include, but are not limited to, 317 Chestnut Street, 320 Chestnut Street (parcel 303004084001000), and 500 Chestnut Street (parcel 303005281001000), Atlantic, Iowa. According to information obtained through the Cass County Assessor's parcel search, the facility at 317 Chestnut Street is currently unoccupied, the facility at 320 Chestnut Street is currently operated as a Napa Auto Parts retail store, and 500 Chestnut Street is currently operated as Cass County Cleaners.

2.2 BACKGROUND

Table 1 summarizes other previous drycleaner or laundry facilities in the area of the Site:

TABLE 1

SUMMARY OF FORMER DRYCLEANERS
PCE CHESTNUT STREET, ATLANTIC, IOWA

Address	Use and Date or Date Range
217 Walnut Street	Listed in the 1962 City Directory as Pauls Cleaners.
624 Walnut Street	Listed as a Laundry facility on the 1883 and 1888 Sanborn maps.
628 Walnut Street	Listed as a Laundry facility on the 1883 Sanborn map.
218 Chestnut Street	Listed as a Drycleaner on the 1949 and 1957 Sanborn maps.
302 or 304 Chestnut Street	Listed as Chine Laundry on the 1899 Sanborn maps.
309 Chestnut Street	Listed as a Laundry facility on the 1899 Sanborn map.
315 Chestnut Street	Former drycleaner based on previous site work.
317 Chestnut Street	Listed in the 1962 City Directory as Albertson Cleaners.
318 Chestnut Street	Former drycleaner based on previous site work.
14 E. 4th Street	Listed as a Drycleaner on the 1923, 1931, 1949, and 1957 Sanborn maps.
19 W. 4th Street	Listed as City Steam Laundry on the 1913 Sanborn map.
13 W. 4th Street	Listed as City Steam Laundry on the 1908 Sanborn map.
410 Poplar Street	Listed as a Drycleaner on the 1949 and 1957 Sanborn maps.
Poplar Street and W. 5th Street	Listed as a Drycleaner on the 1931 Sanborn map.
413 Walnut Street	Listed as Steam Laundry on the 1908, 1913, and 1923 Sanborn maps.
500 Chestnut Street	Listed as the Cass County Cleaners in the current Cass County parcel search database.
511 Chestnut Street	Listed as a Drycleaner on the 1923 Sanborn maps.

TABLE 1 (Continued)

SUMMARY OF FORMER DRYCLEANERS
PCE CHESTNUT STREET, ATLANTIC, IOWA

Address	Use and Date or Date Range
508-510 Walnut Street	Listed as a Laundry facility on the 1931 Sanborn map.
610 Chestnut Street	Listed as a Steam Laundry facility on the 1883, 1888, and 1893 Sanborn maps.
203 Locust Street	Listed in the 1962 City Directory as Ace Cleaners.
606 E. 10th Street	Listed in the 1962 City Directory as Atlantic Laundry & Dry Cleaners.

2.3 GEOLOGY AND HYDROGEOLOGY

Geologic stratigraphy in the Site vicinity consists of Pleistocene alluvium, loess, and glacial drift deposits to an investigated depth of 50 feet (Tetra Tech EM Inc. 2004). Cretaceous Dakota Sandstone underlies the Pleistocene deposits, and Pennsylvanian-aged shale and limestone comprise the bedrock beneath the Dakota Sandstone.

Sources of groundwater in the Site area include alluvial valley aquifers, glacial-drift aquifers, and the Dakota Formation (U.S. Geological Survey [USGS] 1992). The alluvial aquifers are primarily composed of deposits along existing river valleys. The alluvial valley nearest to Atlantic is the east fork of the Nishnabotna River and its tributary, Troublesome Creek. The alluvial aquifer underlying the valley is relatively shallow, at average depth of 21 feet, and is composed of fine-grained deposits. Thickness of the aquifer ranges from approximately 2 to 43 feet.

Atlantic Municipal Utilities (AMU) draws its water solely for public use from the Nishnabotna Member of the Dakota Formation. The Dakota is a fine- to coarse-grained sandstone, very poorly cemented (friable), partly pebbly to conglomeratic, and locally interbedded with seams of clay (Iowa Department of Natural Resources [IDNR] 1996). Secondary lithologies include chert-quartz gravel, conglomerate, and gray to variegated mudstone with some siderite pellets. The formation is approximately 40 to 60 feet thick in the Atlantic wellhead protection area, providing abundant pore space for groundwater storage. In the wellhead protection area, the Dakota is upwardly confined by clay-rich glacial till.

The Dakota aquifer is recharged by downward percolation through Pleistocene deposits and by lateral groundwater inflow from southwest Minnesota. Regional groundwater flow is from north to south, and natural discharge from the aquifer occurs into the lower reaches of major rivers in the region. Locally, groundwater flows from south to north (the direction of PCE migration), resulting from a combination of topography and groundwater pumping from the municipal well field.

Below the Dakota is an aquiclude of impermeable, calcareous, gray-blue-red shales, with interbedded limestones, belonging to the Missourian Series of Pennsylvanian age. These shales are encountered at

85 to 90 feet below ground surface (bgs) and are approximately 725 feet thick in the Atlantic area (Lockheed Martin Technology Service [Lockheed Martin] 2005).

2.4 PREVIOUS INVESTIGATIONS

The following are descriptions of previous investigations at the Site:

2.4.1 PCE Former Dry Cleaners

The Site was discovered during vapor intrusion sampling at the adjacent PCE Former Dry Cleaners site in March 2015. During that sampling event, sub-slab vapor and indoor air samples were collected at residences and commercial buildings primarily downgradient and crossgradient of the suspected contaminant source of the PCE Former Dry Cleaners site (the former Norge Dry Cleaning Village at 1205 East 7th Street).

Included in the sampling event were commercial buildings at 315 and 319 Chestnut Street, approximately 1.0 mile west-northwest (crossgradient) of the former Norge Dry Cleaning Village. Indoor air sample results from those buildings indicated PCE at concentrations above its Regional Screening Level (RSL) for industrial air of 47 micrograms per cubic meter ($\mu g/m^3$). Groundwater flow at the Site is generally to the north; therefore, contamination from the former Norge Dry Cleaning Village (associated with the PCE Former Dry Cleaner site) is not suspected to influence PCE concentrations identified at commercial buildings along Chestnut Street. The 317 Chestnut Street building, currently unoccupied, is the former location of a dry cleaner. A review of historical documents and interviews with locals has indicated that three other dry cleaners were formerly in operation in the downtown area (along Chestnut and Poplar Streets). Those dry cleaners operated at 318 Chestnut Street, 500 Chestnut Street, and 410 Poplar Street. These former dry cleaners are potential sources of PCE (and trichloroethene [TCE], a degradation product of PCE) at the Site.

Based on these sample results, EPA installed vapor mitigation systems at 315, 317, and 319 Chestnut Street. A system was installed at 317 Chestnut Street based on its proximity to 315 and 319 Chestnut Street, both of which were found to have elevated indoor air concentrations of PCE (Tetra Tech 2016).

2.4.2 PCE Chestnut Street Removal Site Evaluation

EPA tasked Tetra Tech START to conduct a removal at the PCE Chestnut Street site in Atlantic, Iowa. Removal activities included collection of vapor intrusion and groundwater samples. Removal sampling activities occurred from July 2015 to September 2016.

Vapor intrusion investigations involved collection of 177 indoor air, 114 sub-slab soil gas, 26 outdoor soil gas, and 5 ambient air samples at businesses and residences near and downgradient of suspected contaminant sources. Groundwater sampling was also conducted at 61 temporary wells (total of 201 groundwater samples). Samples were analyzed by the EPA Region 7 laboratory, an on-site mobile laboratory, or a commercial laboratory (subcontracted by Tetra Tech). Sample results (for PCE and TCE in particular) were then compared to site-specific Removal Action Levels (RAL), Vapor Intrusion Screening Levels (VISL), and Maximum Contamination Levels (MCL), established by EPA.

VAPOR INTRUSION SAMPLING

Of the 322 vapor intrusion samples, PCE or TCE was detected at concentrations above site-specific RALs in 24 indoor air samples collected at 10 different businesses and residences. No samples collected in sub-slab soil gas, outdoor soil gas, or ambient air contained PCE or TCE concentrations exceeding EPA VISLs or RALs. However, notably high concentrations of contaminants were found in a number of sub-slab samples, such as 4,684.9 µg/m^3 of PCE at 327 Chestnut Street and 154.8 µg/m^3 of TCE at 420 Chestnut Street.

Table 2 below summarizes sampling periods, types, and laboratories in which the data were analyzed. The predominant sample type within each batch (set of samples submitted for analysis during the same sampling period) is listed first. The numbered Analytical Services Requests (ASR) refer to samples submitted to the EPA Region 7 laboratory in Kansas City, Kansas.

TABLE 2

LABORATORIES, SAMPLE TYPES, AND SAMPLING PERIODS
PCE CHESTNUT STREET, ATLANTIC, IOWA

Laboratory	Sample Type	Month/Year
EPA ASR 6837	Indoor Air; Ambient Air	July 2015
EPA Mobile Lab	Sub-slab; Indoor Air	July 2015
Commercial Lab	Indoor Air	October 2015
EPA ASR 6998	Indoor Air	February 2016
EPA Mobile Lab	Sub-slab	February 2016
EPA ASR 6999	Indoor Air	March 2016
EPA Mobile Lab	Sub-slab; Indoor Air; Outdoor Soil Gas	May 2016
EPA ASR 7000	Indoor Air	May 2016
EPA ASR 7001	Indoor Air	June 2016
EPA ASR 7002	Indoor Air; Ambient Air	August 2016
EPA Mobile Lab	Sub-slab; Indoor Air	September 2016
EPA ASR 7003	Indoor Air	September 2016

Notes:

ASR Analytical Services Request
EPA U.S. Environmental Protection Agency
PCE Tetrachloroethene

All samples submitted via ASR were collected in Summa® canisters. Three samples, collected in October 2015, were submitted to [redacted] rather than the EPA Region 7 laboratory. Indoor air, sub-slab soil gas, and outdoor soil gas samples collected in Tedlar bags were analyzed on site by the EPA Region 7 mobile laboratory (mobile laboratory) operated by EPA personnel.

Analytical Data Summary

Analyte concentrations were compared to site-specific RALs, VISLs, and MCLs to determine the significance of contamination. RALs, VISLs, and MCLs for the respective sample types are listed in Table 3:

TABLE 3

RALs, VISLs, AND MCLs
PCE CHESTNUT STREET, ATLANTIC, IOWA

	PCE	TCE
RAL for Indoor Air, Residential:	42 µg/m³	2 µg/m³
RAL for Indoor Air, Industrial:	180 µg/m³	6 µg/m³
VISL for Soil Gas, Residential:	1400 µg/m³	67 µg/m³
VISL for Soil Gas, Industrial:	6000 µg/m³	200 µg/m³
MCL for Groundwater:	5 micrograms per liter (µg/L)	5 µg/L

Notes:

µg/L	Micrograms per liter	PCE	Tetrachloroethene
µg/m³	Micrograms per cubic meter	TCE	Tetrachloroethene
RAL	Removal Action Level	VISL	Vapor Intrusion Screening Level
MCL	Maximum Contaminant Level		

Indoor Air Sample Results

In the 177 indoor air samples collected, 25 volatile organic compounds (VOC) were detected at concentrations ranging from 0.319 (benzene) to 3,700 (2-propanol) µg/m³. Because PCE and TCE are the primary site-related contaminants, only results for those are summarized below. PCE was detected in 139 of the 177 indoor air samples at concentrations ranging from 0.475 to 550 µg/m³. Three indoor air samples collected at one private residence contained PCE at concentrations above the residential RAL of 42 µg/m³, while 10 samples collected at four business locations contained PCE at levels above the industrial RAL of 180 µg/m³. Sample 6837-1, collected at 500 Chestnut Street, contained PCE at 500 µg/m³. An indoor air grab sample collected at this location (analyzed by the mobile laboratory) also contained PCE at 243.5 µg/m³. An indoor air grab sample collected at 318 Chestnut Street contained PCE

at 206.3 µg/m³. Both 500 Chestnut Street and 318 Chestnut Street are addresses of former dry cleaners, and are suspected source areas of PCE contamination.

TCE was detected in 60 of the 177 indoor air samples at concentrations that ranged from 0.483 to 450 µg/m³. The highest concentration was detected on March 8, 2016, at a business (Atlantic Sign) at 7 East 4th Street. Seventeen indoor air samples collected at eight businesses were found to contain TCE at concentrations above the industrial RAL of 6 µg/m³. No samples collected at residences were found to contain TCE at concentration above the residential RAL of 2 µg/m³. Table 4 below summarizes results from samples that exceed the site-specific Removal Action Level for PCE and/or TCE.

TABLE 4

INDOOR AIR SAMPLE RESULTS
PCE CHESTNUT STREET, ATLANTIC, IOWA

Address	Use	PCE (µg/m³)	TCE (µg/m³)	Sample Date
315 Chestnut Street	Business	550		4/1/2015
317 Chestnut Street	Business	320		9/8/2016
318 Chestnut Street	Business	350	24	8/10/2016
		300	16	5/12/2016
		213.9	18.6	7/22/2015
		206.3	18.4	7/22/2015
			9	2/9/2016
319 Chestnut Street	Business	180		4/1/2015
400 Chestnut Street	Business		45.55	7/22/2015
			73	2/10/2016
			18	3/9/2016
402 Chestnut Street	Business		24.5	7/14/2015
500 Chestnut Street	Business	500	49.2	7/14/2015
		410		3/9/2016
		243.5	7.14	7/22/2015
7 East 4th Street	Business		450	3/8/2016
11 East 4th Street	Business		41	5/12/2016
13 East 4th Street	Business		104.1	7/22/2015
			78.8	10/8/2015
			68	5/12/2016
13 East 4th Street	Business		387	5/11/2016
214 Locust Street	Residential	360		9/7/2016
		241.2		5/11/2016
		150		3/8/2016

Notes:

µg/m³	Micrograms per cubic meter
PCE	Tetrachloroethene
TCE	Trichloroethene

The majority of the other VOCs detected in the indoor air samples are not considered site-related contaminants and are not summarized in this report.

Sub-Slab Vapor Sample Results

Sub-slab soil gas samples were analyzed on site by the EPA Region 7 mobile laboratory for only PCE and TCE. PCE was detected in 89 of the 114 sub-slab samples at concentrations that ranged from 2.14 to 4,684.9 µg/m^3. The highest PCE concentration was detected on July 21, 2015, at a business (Brocker, Karns, and Karns) at 327 Chestnut Street. TCE was detected in 15 of the 114 samples at concentrations that ranged from 3.44 to 154.8 µg/m^3. The highest concentration was detected on July 22, 2015, at a business (Tanner's Fashions) at 420 Chestnut Street. In no sub-slab sample did a concentration of PCE or TCE exceed the VISL for PCE (1,400 µg/m^3 Residential, 6,000 µg/m^3 Industrial) or TCE (67 µg/m^3 Residential, 200 µg/m^3 Industrial).

Outdoor Soil Gas Sample Results

The outdoor soil gas samples were analyzed on site by the EPA Region 7 mobile laboratory only for PCE and TCE. PCE was detected in 13 of 26 samples at concentrations that ranged from 13.7 to 1,563.1 µg/m^3. The highest PCE concentration was detected behind businesses west of Chestnut Street, and does not exceed the Industrial VISL of 6,000 µg/m^3.

Ambient Air Sample Results

In the five ambient air samples, 33 VOCs were detected at concentrations that ranged from 0.629 µg/m^3 (carbon tetrachloride) to 60.1 µg/m^3 (methylene chloride). The highest detected PCE concentration was 3.25 µg/m^3 at 303 Chestnut Street. TCE was not detected at concentrations above the laboratory reporting limit (0.43 µg/m^3) in any ambient air sample, and in no sample was an analyte detected at a concentration above a RAL.

Followup Actions

To date, EPA has installed vapor mitigation systems at 312, 315, 317, 318, 319, 321, 327, and 420 Chestnut Street, and 217 Locust Street. Sample results from future vapor intrusion sampling at the Site will be reviewed by EPA for removal evaluation.

GROUNDWATER SAMPLING

As part of the removal activities, 201 groundwater samples were collected from 61 temporary Geoprobe® wells. [redacted] conducted Geoprobe® operations in October 2015, while EPA personnel using EPA equipment performed sampling operations in September 2016. Groundwater sample locations were selected to identify source areas and to delineate extent of PCE contamination in groundwater. During the operations of October 2015, a Geoprobe Screen Point 15 groundwater sampling apparatus was driven to refusal, and a disposable 4-foot-long polyvinyl chloride (PVC) screen was deployed. Operations during September 2016 followed the same procedure, although with a Geoprobe Screen Point 16 and a stainless steel screen. At each well location, samples were collected within multiple depth intervals. Within each sample interval, groundwater was collected through disposable polyethylene tubing fitted with a check valve.

Groundwater samples were collected for analysis for VOCs. The mobile lab examined 133 samples, 33 of which were also submitted to the EPA Region 7 laboratory (under ASR 6929) for confirmation analysis. Twelve additional temporary wells were also installed, from which 38 samples were collected and also submitted to the EPA Region 7 laboratory (under ASR 7217) for analysis. Samples analyzed by the mobile lab were each collected in two unpreserved 40-milliliter (mL) volatile organic analysis (VOA) vials. Each sample submitted to the EPA Region 7 laboratory was collected into four 40-mL VOA vials preserved with hydrochloric acid (HCl). After collection, all samples were labeled and packaged, and placed in a cooler maintained at or below a temperature of 4 degrees Celsius (°C) from time of collection until submittal to the mobile laboratory or EPA Region 7 laboratory for analysis.

Of the 201 groundwater samples, 20 samples from nine different temporary wells were found to contain PCE or TCE at concentrations exceeding EPA MCLs. One well contained high levels of contaminants associated with petroleum products, believed related to a nearby leaking underground fuel storage tank.

Analytical Data Summary

Mobile Laboratory

Groundwater samples were analyzed by the mobile laboratory for PCE and its degradation products, TCE, *cis*-1,2-dichloroethene (DCE), and *trans*-1,2-DCE. Of the 133 groundwater samples analyzed by the mobile laboratory, PCE was detected in 18 (collected from 12 temporary wells) at concentrations that ranged from 1.2 to 82.7 micrograms per liter (µg/L). PCE was the compound detected most frequently and at highest concentrations. Three samples contained PCE at levels above its MCL of 5.0 µg/L. Those samples were collected at two locations, one at TW15-21 and two at TW15-34 (at separate depth

intervals). The highest concentration of PCE (82.7 µg/L) was detected in one of the samples collected at TW15-34 (within 31-35 feet bgs). That sample also contained TCE at 10.3 µg/L, above its MCL of 5.0 µg/L. None of the other degradation products was detected above its MCL.

EPA Region 7 Laboratory

Among the 71 samples analyzed by the EPA Region 7 laboratory, 18 separate VOCs were detected at concentrations ranging from 1.0 to 2,200 J µg/L (benzene). The J-coded value indicates the result was estimated. The sample collected at TW15-32 (within 30 to 34 feet bgs) contained the most detected VOCs, which were primarily associated with petroleum products and are not site-related. Three VOCs were detected in this sample at concentrations above their respective MCLs: benzene, 1,2-dichloropropane, and toluene. Identification of petroleum-related contamination at this location was forwarded to IDNR for review. Specific to the Site, PCE was detected in 25 samples at concentrations that ranged from 1 J to 96 µg/L. Among these, 15 samples contained PCE at concentrations above its MCL of 5.0 µg/L. In general, results from laboratory confirmation samples corresponded well with mobile laboratory results.

Table 5 lists results for VOCs from groundwater samples collected in October 2015 and September 2016 that exceeded MCLs.

TABLE 5

GROUNDWATER SAMPLE RESULTS
PCE CHESTNUT STREET, ATLANTIC, IOWA

Sample	Sample Date	Depth (feet bgs)	PCE	TCE	1,2-Dibromoethane	1,2-Dichloroethane	1,2-Dichloropropane	Benzene	Ethyl Benzene	m and/or p-Xylene	Toluene
TW15-20	10/7/2015	28-32	5.2								
TW15-21	10/7/2015	31-35	6.7								
TW15-32	10/8/2015	30-34			13	30	12	2200 J	470 J	1800 J	2000
TW15-34	10/9/2015	23-27	13.3								
		31-35	82.7	10.3							
GPW-2	9/7/2016	23-27	64	29							
		31-35	96	39							
GPW-3	9/6/2016	23-27		5.3							
		31-35		5.8							
GPW-6	9/6/2016	23-27	17								
		31-35	33								
		41-45	5.6								
GPW-7	9/6/2016	23-27	5.3								
		31-35	11								
		41-45	38								
GPW-8	9/7/2016	23-27	7.9								
		31-35	19								
		41-45	8.5								
GPW-12	9/6/2016	23-27						480 J	490 J	1100 J	
		31-35	72	8.5							
		41-45	63	5.3							

Notes:

bgs	Below ground surface
J	Estimated value
PCE	Tetrachloroethene
TCE	Trichloroethene

2.5 WASTE CHARACTERISTICS

This section discusses waste characteristics of known contaminants at the Site.

2.5.1 Tetrachloroethene

PCE is a nonflammable colorless liquid, and is typically used as a dry cleaning agent and metal degreasing solvent. It is also used as a starting material (building block) for making other chemicals and is used in some consumer products (Agency for Toxic Substances and Disease Registry [ATSDR] 2014). PCE is denser than water and tends to be found at greater depths with increasing distance from the source area.

PCE was introduced as a dry cleaning solvent in 1934, and by 1948 had replaced carbon tetrachloride (CCl_4) as the major chlorinated dry cleaning solvent used in the United States (petroleum solvents still dominated overall). By 1962, dry cleaning operations accounted for 90 percent of the PCE used in the United States. At one time, PCE had been mixed with grain protectants and certain liquid grain fumigants, but this was no longer approved by 1980 (Meister Publishing Company [Meister] 1980). PCE degrades to TCE.

2.5.2 Trichloroethene

TCE is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste (ATSDR 2003). It is used mainly as a solvent to remove grease from metal parts, and is an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers. TCE is denser than water and is typically found at greater depths with increased time or distance from the source area. TCE is reasonably anticipated to be a human carcinogen. Drinking small amounts of TCE for long periods may cause liver and kidney damage, impaired immune system function, and impaired fetal development in pregnant women (ATSDR 2003). The *cis* and *trans* isomers of 1,2-DCE, as well as vinyl chloride, are common degradation products from TCE.

3.0 HAZARD RANKING SYSTEM FACTORS

This section discusses the sources of contamination and the various contaminant migration pathways that will be evaluated under the HRS.

3.1 SOURCES OF CONTAMINATION

Groundwater samples were collected during the removal activities to assess current conditions of VOC contamination identified during previous investigations. Soil sampling has been proposed, but samples have not yet been collected. Sources of contamination at this site are assumed contaminated soils (as identified by results from indoor air and sub-slab vapor samples) and contaminated groundwater. Because no soil samples have been collected, areas or volume of contaminated soil have not yet been estimated or quantified.

Elevated levels of PCE were identified in indoor air samples from the following commercial addresses: 315 Chestnut Street, 317 Chestnut Street, 318 Chestnut Street, 319 Chestnut Street, and 500 Chestnut Street. Elevated levels of PCE were also identified in sub-slab samples collected at the following commercial addresses: 312 Chestnut Street, 315 Chestnut Street, and 327 Chestnut Street. Elevated levels of PCE were also identified in indoor air samples collected at the private residence at 214 Locust Street. Elevated levels of TCE were detected in indoor air samples collected at the following commercial addresses: 7 E 4th Street, 11 E 4th Street, 13 E 4th Street, 318 Chestnut Street, 400 Chestnut Street, 402 Chestnut Street, and 500 Chestnut Street. However, the only site related elevated TCE concentration corresponds to 500 Chestnut Street. The remainder of the commercial facilities with elevated TCE levels correspond to ongoing business operations and are not site related.

In groundwater, PCE was detected within 23 to 27 and 31 to 35 feet bgs in GPW-2 at concentrations of 64 and 96 µg/L, respectively. TCE was also detected within the same depth intervals in GPW-2 at concentrations of 29 and 39 µg/L, respectively. TCE was detected within 23 to 27 and 31 to 35 feet bgs in GPW-3 at concentrations of 5.3 and 5.8 µg/L, respectively. PCE was detected in GPW-6 at 17 µg/L within 23 to 27 feet bgs, 33 µg/L within 31 to 35 feet bgs, and 5.6 µg/L within 41-45 feet bgs. PCE was detected in GPW-7 at 5.3 µg/L within 23 to 27 feet bgs, 11 µg/L within 31 to 35 feet bgs, and 38 µg/L within 41-45 feet bgs. PCE was detected in GPW-8 at 7.9 µg/L within 23 to 27 feet bgs, 19 µg/L within 31 to 35 feet bgs, and 8.5 µg/L within 41-45 feet bgs. PCE was detected in GPW-12 within 31 to 35 and 41 to 45 feet bgs at concentrations of 72 and 63 µg/L, respectively. TCE was also detected within the same depth intervals in GPW-12 at concentrations of 8.5 and 5.3 µg/L, respectively. The hydrologic model suggests the plume begins at approximately 317 Chestnut Street, stretches north-northeast to the

intersection of Chestnut Street and E 3rd Street, and continues north under the railroad tracks toward Troublesome Creek.

3.2 GROUNDWATER PATHWAY

Section 3.2.1 discusses the hydrogeologic setting, groundwater targets, and conclusions drawn from analytical results from groundwater samples. During the site removal activities, START collected groundwater samples from 61 temporary wells.

3.2.1 Hydrogeological Setting

Sources of groundwater in the area of Cass County include alluvial valley aquifers, glacial-drift aquifers, and the Dakota Formation (U.S. Geological Survey [USGS] 1992). The alluvial aquifers are primarily made up of deposits along existing river valleys. The nearest alluvial valley to Atlantic is the east fork of the Nishnabotna River and its tributary, Troublesome Creek. The aquifer underlying the valley is relatively shallow, at average depth of 21 feet, and is composed of fine-grained alluvial deposits. Thickness ranges from approximately 2 to 43 feet. Groundwater can also be obtained from shallow glacial-drift aquifers consisting of glacial and loess deposits over bedrock. Neither the alluvial nor the glacial drift aquifers are known to be used for groundwater production in the Atlantic area.

The City of Atlantic draws its water solely from the Nishnabotna Member of the Dakota Formation. The Dakota is a fine- to coarse-grained sandstone, very poorly cemented (friable), part pebbly to conglomeratic, and locally interbedded with seams of clay (IDNR 1996). Secondary lithologies include chert-quartz gravel, conglomerate, and gray to variegated mudstone with some siderite pellets. At the Site, the Dakota formation is about 35 feet below grade. The formation is approximately 40 to 60 feet thick in the Atlantic wellhead protection area, providing abundant pore space for groundwater storage. In the wellhead protection area, the Dakota is upwardly confined by clay-rich glacial till.

The aquifer is recharged by downward percolation through Pleistocene deposits and by lateral groundwater inflow from southwest Minnesota. Regional groundwater flow is from north to south, and natural discharge from the aquifer occurs into the lower reaches of major rivers in the region. Locally, groundwater flows from south to north (the direction of PCE migration) from a combination of topography and groundwater pumping from the municipal well field.

Average hydraulic characteristics of the Dakota Formation in the wellhead protection area are (USGS 1992):

- Transmissivity = 1,750 to 3,075 square feet per day
- Hydraulic conductivity = 35 to 60 feet per day
- Hydraulic gradient = 0.003 foot per foot.

Below the Dakota is an aquiclude of impermeable, calcareous, gray-blue-red shales, with interbedded limestones, belonging to the Missourian Series of Pennsylvanian age. These shales are encountered at 85 to 90 feet bgs and are approximately 725 feet thick in the Atlantic area.

3.2.2 Groundwater Targets

The 2015 census population for the City of Atlantic is 6,833. Cass County has an average of 2.20 persons per household (U.S. Census Bureau 2015). The entire city well field is within 1.45 mile of the areas associated with the former dry cleaners; two of the wells are within 1 mile. According to a September 2015 inspection of the Atlantic Municipal Utilities by the State of Iowa, the system has 3,366 service connections, including 135 outside the city limits, serving a total population of 7,450.

According to the IDNR well registration database, approximately 277 domestic, commercial, or public water supply wells are within 4 miles of the Site (see Appendix A, Figure 2). Depths of those wells range from 22 to 300 feet. According to the database, 17 registered domestic wells are within 1 mile of the Site (30 to 300 feet deep).

Eight municipal wells (AMU-10 through AMU-17) are on the north side of Troublesome Creek between 1.0 and 1.45 mile from the Site. AMU-6 and AMU-7 are on the south side of the creek, and have been decommissioned due to elevated levels of PCE (see Appendix A, Figure 2). The Atlantic Public Water System (PWS) serves a total population of approximately 7,450 (IDNR 2015). Additional details about the wells are in Table 6. Other wells previously on the south side of the creek (AMU Wells 1-5, 8, and 9) have been decommissioned due to age and diminished performance. All wells pump to a common water treatment facility where the water is blended, treated, and distributed to the system. In addition, no single well produces more than 40 percent of water to the system. Therefore population served by the system can be apportioned equally among the wells.

TABLE 6

CITY OF ATLANTIC PUBLIC WATER SUPPLY WELLS
ATLANTIC, IOWA

Well Number	Well Record Number	Status	Year Constructed	Screened length (feet)	Construction Depth (feet bgs)	Static Water Level (feet bgs)
AMU-6	36160	Inactive	1966	30	80	unknown
AMU-7	1785	Pumped to waste	1942	25	82.8	unknown
AMU-10	36163	Active	1967	25	82.5	77
AMU-11	36164	Active	1973	30	86.3	78
AMU-12	36165	Active	1977	30	85.5	76
AMU-13	36167	Active	1991	30	98	42
AMU-14	36168	Active	1991	30	120	52
AMU-15	36169	Active	1991	30	92.5	28
AMU-16	36170	Active	1991	30	93.7	96
AMU-17	56000	Active	2002	30	75	95

Notes

AMU Atlantic Municipal Utilities
bgs Below ground surface

3.2.3 Groundwater Pathway Conclusions

PCE and its degradation products TCE and *cis*-1,2-DCE were detected in groundwater samples collected at and downgradient of the former drycleaner locations, as discussed in Section 3.1. In September 2016, PCE was detected at a maximum concentration of 96 µg/L in the sample from GPW-2, downgradient of the assumed source area.

PCE was first detected in AMU-7 in August 1982 at a concentration of 170 µg/L. Concentrations have been as high as 260 µg/L (in August 1984), but have been gradually decreasing over time, with a concentration of 69 µg/L in April 2016.

In AMU-6, PCE was detected at the highest concentration of 32 µg/L in September 2016. This concentration was higher than previous results provided by the AMU, and it appears as if the concentration in AMU-6 is trending upward. Following the sampling event in September 2016, AMU-6 was put out of service as a drinking water well. Release of chlorinated solvents to AMU wells is not attributable to contamination at the Site; rather, the source of this is the PCE Former Dry Cleaner site. However, all of the AMU wells are located within 1.45 miles crossgradient of the Site.

3.3 SURFACE WATER PATHWAY

The modeled contaminated groundwater source plume for PCE is north-northeast of the former drycleaners, with the northernmost extension about 0.3 mile southwest of Troublesome Creek, the closest perennial stream, and with the northwest portion of the plume about 0.12 mile southeast of a drainage tributary to the Nishnabotna River. The contaminated soil source for PCE is assumed at the former drycleaner locations, south of the groundwater plume. The normal annual precipitation for Atlantic, Iowa is 36.96 inches, and average snowfall is about 27 inches (U.S. Climate Data 2016). Any surface water at the Site would likely flow to storm sewers or flow overland as sheetflow to the north and potentially enter the unnamed tributary to the Nishnabotna River (locally referred to as Bull Creek). Because the contaminated soil sources at the former drycleaners are assumed covered by a concrete parking lot and are at depth, migration of contaminants from the soil through the surface water pathway is unlikely. However, soil source sampling has yet to be completed.

3.4 SOIL EXPOSURE AND AIR PATHWAY

The Site is in the downtown area, which is largely covered with buildings and paved surfaces. Contaminated soil at the former dry cleaners is assumed covered by asphalt and concrete parking lots and roadways and buildings; however, confirmation soil source sampling had not been completed as of the date of this report. Nevertheless, direct exposure to the contaminated soil is unlikely unless the asphalt, concrete, and buildings are removed. Potential for release to ambient air is also low. However, vapor intrusion in indoor air has been documented through previous sampling. Elevated levels of PCE were identified in indoor air samples from the following commercial addresses: 315 Chestnut Street, 317 Chestnut Street, 318 Chestnut Street, 319 Chestnut Street, 500 Chestnut Street, and 506 Chestnut Street. Elevated levels of PCE were also identified in sub-slab samples from the following commercial addresses: 312 Chestnut Street, 315 Chestnut Street, and 327 Chestnut Street. Elevated levels of PCE were also identified in indoor air samples collected at the private residence at 214 Locust Street. Elevated levels of TCE were identified in indoor air samples from the following commercial addresses: 7 E 4th Street, 11 E 4th Street, 13 E 4th Street, 318 Chestnut Street, 400 Chestnut Street, 402 Chestnut Street, and 500 Chestnut Street. However, the only site related elevated TCE concentration corresponds to 500 Chestnut Street. The remainder of the commercial facilities with elevated TCE levels correspond to ongoing business operations and are not site related.

4.0 REMOVAL ACTION CONSIDERATIONS

The National Contingency Plan (40 *Code of Federal Regulations* [CFR] 300.415(b) (2)) authorizes EPA to consider removal actions at those facilities that pose an imminent threat to human health or the environment. Additional sampling is occurring at the Site to assist in delineation of the extent of contamination and the source areas of contamination, under an ongoing Removal.

5.0 SUMMARY

The Site is in Atlantic, Cass County, Iowa. Physical addresses of potential source areas within the Site include, but are not limited to, 317 Chestnut Street, 320 Chestnut Street (parcel 303004084001000), and 500 Chestnut Street (parcel 303005281001000), Atlantic, Iowa. According to information obtained through the Cass County Assessor's parcel search, the facility at 317 Chestnut Street is currently unoccupied, the facility at 320 Chestnut Street is currently operated as a Napa Auto Parts retail store, and 500 Chestnut Street is currently operated as Cass County Cleaners. Results of previous investigations at the Site are conveyed in Section 2.4 above.

The general objective of the PA was to determine whether any threats to human health or the environment exist as a result of releases to soil and groundwater. Additional investigative sampling efforts are recommended to determine if complete, contaminated migration pathways exist. The recommended sampling efforts include surface water and sediment sampling, additional groundwater sampling including but not limited to private drinking water wells, and source soil sampling.

In late February 2016, revisions to the HRS were proposed to the *Federal Register*. These revisions include a new component to the soil exposure pathway that would consider subsurface intrusion (vapor intrusion) to workplaces and residences. Subsurface intrusion has been identified as posing significant threats to human health and the environment that should be considered when evaluating sites for inclusion on the NPL. Subsurface intrusion occurs when contaminants are released, enter the subsurface environment, and move into occupied structures (e.g., residences, workplaces, and other buildings) as a gas, vapor, or liquid. Thus, EPA is considering adding a new screening component to the HRS that would allow evaluation of sites for contaminated vapor intrusion as part of consideration for inclusion on the NPL. This addition would enable the HRS to directly consider human exposure to contaminants that enter building structures through the subsurface environment. Finalization of revisions to the HRS is expected in January 2017. To determine subsurface intrusion targets for use in the new HRS calculation, a survey to determine the number of employees and/or residents at each location should occur. Following the additional soil, groundwater, sediment, and surface water sampling, and completion of the population census, an HRS evaluation will occur.

6.0 REFERENCES

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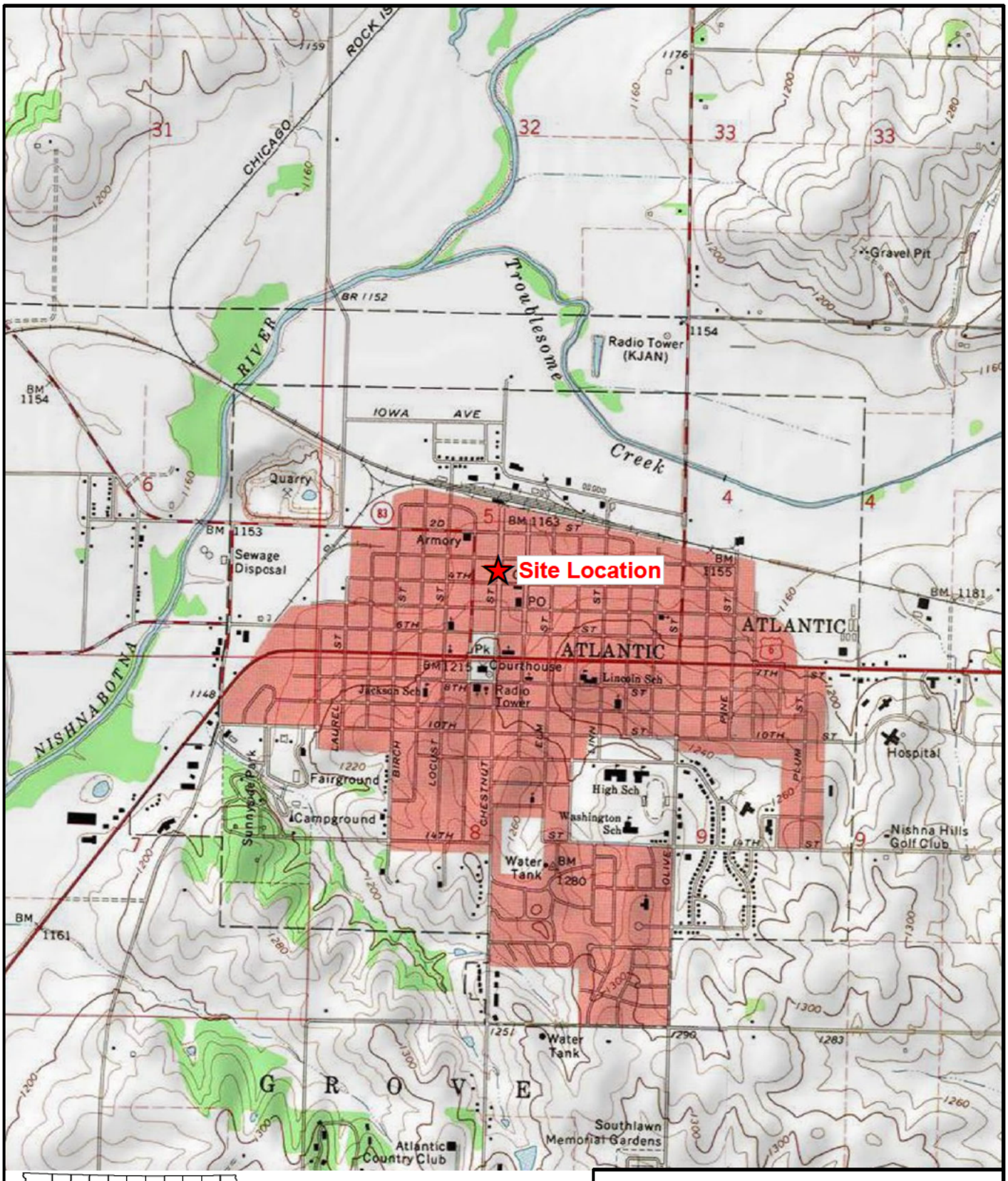
APPENDIX A

FIGURES



Source: USGS Atlantic, Iowa 7.5 Minute Topo Quad, 1991
USGS Wiota, Iowa 7 5 Minute Topo Quad, 1971

PCE Chestnut Street Site
Atlantic, Iowa

Figure 1
Site Location Map

TETRA TECH

Date 12/21/2016 Drawn By [redacted] Project No X9025.16.0111.003

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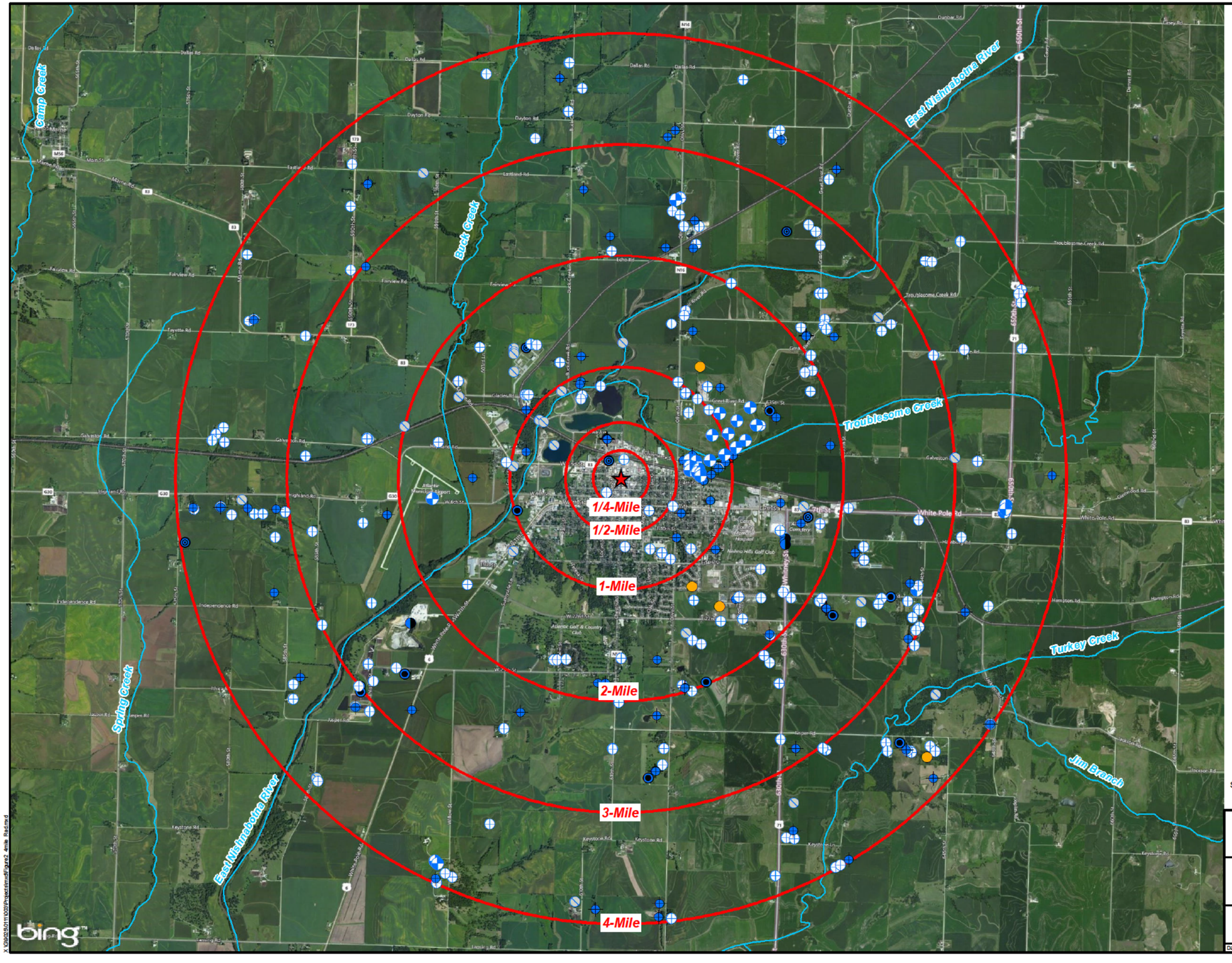

Legend

- Site location
- Commercial/Industrial well location
- Heat pump well location
- Irrigation well location
- Livestock well location
- Other well location
- Private well location
- Public well location
- Test/Monitoring well location
- Stream/River
- Radius ring

N

0 2,250 4,500

Feet

Source: ESRI, ArcGIS Online, Bing Maps Hybrid 2011;
ESRI Data Maps, 2007;
Iowa DNR, All Registered Wells in the State of Iowa Database, 2015

PCE Chestnut Street Site
Atlantic, Iowa

Figure 2

4-Mile Radius Well Map

TETRA TECH

Date 11/30/2016 Drawn By [redacted] Project No XS025.16.0111.003

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